

its periphery, is adapted to support the weight of the pipe (1) and the frictions when the latter is laid from the surface.

4. Heat insulation device according to [any one of claims 1 to 3] claim 1, characterized in that the protective envelope (3) is deformable in order to follow the variations in volume of the insulating coating that it contains under the effect of the hydrostatic pressure and upon variations in temperature.

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5. Heat insulation device according to [any one of claims 1 to 4] claim 1, characterized in that the protective envelope (3) comprises at least one vent permeable to the gas that may diffuse through said underwater pipe (1) and generated by the effluents which circulate therein.

6. Device according to [any one of claims 2 to 5] claim 2, characterized in that the matrix (2) is constituted by a light, cellular or fibrous material and said virtually incompressible material (4) which impregnates it has a melting temperature ( $T_0$ ) included between 20 and 80°C.

7. Device according to [any one of claims 1 to 6] claim 1, characterized in that said material (4) has a thermal conductivity less than 0.3 Watt/meter/degree Celsius in solid phase and an enthalpy of fusion greater than 50 kilojoule/kilogram.

8. Insulation device according to [any one of claims 2 to 7] claim 2, characterized in that said matrix (2) occupies only a part of the volume of the annular space defined by said protective envelope (3) and said pipe (1).

9. Device according to [any one of claims 1 to 8] claim 1, characterized in that it comprises distance pieces (9) regularly spaced apart along the pipe (1) on which they abut and supporting the protective envelope (3).

10. Device according to [any one of claims 1 to 9] claim 1, characterized in that the protective envelope (3) is made of thermoplastics material.

11. Device according to [any one of claims 1 to 10] claim 1, characterized in that said virtually incompressible material (4) is constituted, to at least 90%, of chemical compounds of the family of alkanes, preferably a paraffin comprising a hydrocarbon chain with at least 10 carbon atoms.

13. Heat insulation device according to [one of claims 1 to 12] claim 1, characterized in that the outer perimeter (24) of the transverse section of said protective envelope (3) is a closed curve of which the ratio of the square of the length over the surface that it defines is at least equal to 13.

17. Device according to [any one of claims 13 to 16] claim 16, characterized in that it comprises at least two pipes (I) disposed along the same plane and the transverse section of

said envelope (3) is of shape elongated in the same direction as this plane.

18. Device according to [any one of claims 13 to 16] claim 13, characterized in that the perimeter (24) of the transverse section of said envelope (3) comprises concave reversed curvatures (35).

19. Device according to [any one of claims 13 to 18] claim 13, characterized in that it comprises a wear plate (21) disposed on a part of said outer perimeter (24) of the envelope (3).

20. Device according to claim 19 [and according to any one of claims 14 to 17], characterized in that said wear plate (21) is disposed along one of the large sides of the transverse section of said envelope (3).

21. Device according to [any one of claims 13 to 20] claim 13, characterized in that the ratio of the square of the length of the outer perimeter (24) of the transverse section of said protective envelope (3) on the surface that said perimeter defines is at least equal to 16.

22. Device according to [any one of claims 13 to 21] claim 13, characterized in that the protective envelope (3) comprises a lower "U"-shaped part (3<sub>1</sub>) in which are disposed said pipes (1) and a lid (34) assembled on this envelope (3).